

A1
Amended
hexaboride and mixtures thereof, said silicon boride composition being present in a range from about 0.1 to about 80 weight percent in said molten metal.

A2
9. (Amended) A metal matrix composite horseshoe having improved vibration damping and stiffness, said horseshoe comprising a metal matrix composite that is formed from molten aluminum metal and from particles of silicon boride composition selected from the group consisting of silicon tetraboride, silicon hexaboride and mixtures thereof, said silicon boride composition being present in a range from about 0.1 to about 80 weight percent in said molten aluminum metal.

The changes to Claims 1 and 9 are shown in Appendix A.

REMARKS

In the Official Action dated May 15, 2002, Claims 1-16 were rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 5,573,607 to Weaver (which was cited and specifically incorporated by reference in the above-captioned application) (herein "the '607 Patent") in combination with Japanese Patent 407076749A to Eiko et al. (herein "Eiko L"). Claims 1-16 were also rejected on the grounds of non-statutory double patenting based on the same references.

In response to the Official Action, Claims 1 and 9 have been amended to more particularly point out the subject matter of the invention and to overcome the rejection of Claims 1-16 on the basis of non-statutory double patenting. In addition, the Applicant submits the Declaration of the inventor, Samuel C. Weaver, which further evidences the patentability of the claimed invention. (cited herein as

“Weaver Decl. ¶1.”) The Applicant respectfully submits that Claims 1-16 as presently amended are patentable for the reasons that are further explained herein.

The invention of the subject application is directed to an improvement in horseshoes. The presently disclosed invention addresses a long-felt need in the prior art for an improved horseshoe and overcomes a shortcoming of horseshoes that are made of metals and metal alloys. It has been known in the prior art that metal alloy horseshoes are relatively lightweight in comparison to traditional ferrous metal horseshoes. It also has been known that some metal alloy horseshoes are ductile so as to provide cushioning to the hoof. However, horseshoes that afforded cushioning because they were ductile also tended to lose their shape. Therefore, there was a need in the prior art for a horseshoe that was not only lightweight, but that also provided a higher degree of stiffness so that the horseshoe would better retain its shape while still cushioning the hoof. The presently disclosed metal matrix composite horseshoe provides both improved stiffness and cushioning as further described in the subject application.

More specifically, the subject application discloses a metal matrix composite horseshoe that is preferred because it is lightweight and has high stiffness while it also affords cushioning for the hoof. The cushioning is due to relatively high vibration damping in the metal matrix composite. (Weaver Decl. ¶ 7.) High vibration damping is not a property that is common to all metal matrix composites. (Weaver ¶¶ 9, 15 and 16.) Without specific testing of a metal matrix composite, there is no way to reliably predict the degree of vibration damping for the metal matrix composite. (Weaver ¶¶ 14, 15 and 16.) But, it has been found that high

vibration damping is a property of the metal matrix composite that is disclosed in the subject application. (Weaver ¶¶ 15 and 17.)

The metal matrix composite in the horseshoe is comprised of (1) a metal selected from the group consisting of aluminum, magnesium, titanium, and mixtures thereof; and (2) particles of silicon tetraboride or silicon hexaboride. The specific gravities of silicon tetraboride and silicon hexaboride are similar to the specific gravity of aluminum. One important consequence of that similarity is that when the silicon tetraboride or silicon hexaboride particles are mixed with molten aluminum, magnesium or titanium, the silicon tetraboride or silicon hexaboride particles remain homogeneously suspended with a limited degree of agitation of the melt. This tends to lower oxide inclusions in the mixture and improve the purity of the metal matrix composite.

Claim 1 is patentable over Weaver (A) (herein "the '607 Patent") in that, among other reasons, Claim 1 requires:

"A metal matrix composite horseshoe having improved vibration damping and stiffness, said horseshoe comprising a metal matrix composite that is formed from a molten metal selected from the group consisting of aluminum, magnesium, titanium and mixtures thereof...

"

There is no teaching in the '607 Patent that would lead one skilled in the art to produce a horseshoe with improved vibration damping and stiffness as now required by Claim 1. The '607 Patent has no mention that the metal matrix

composite affords “vibration damping” in combination with “stiffness” such that it would be even considered as useful in making an improved horseshoe for which those properties are desired. (Weaver Decl. ¶ 9) At the time that the ‘607 Patent issued, the high vibration damping property of the metal matrix composite was unknown and unexpected. (Weaver Decl. ¶¶ 14, 15 and 16.) The high vibration damping property of the metal matrix composite was learned from testing of that material years after the ‘607 Patent was issued. (Weaver ¶¶ 14 – 19.)

Specifically, the ‘607 Patent states that aluminum and magnesium are used in a “wide variety of industries” and that titanium is used to a lesser extent. (Column 1, lines 19-22.) The ‘607 Patent teaches that the usefulness of aluminum, magnesium and titanium is limited due to “drawbacks” - including low stiffness, high thermal coefficient of expansion, and low strength. (Column 1, lines 22-25.) The ‘607 Patent also teaches that “some of the drawbacks have been overcome through the use of metal matrix composites of those metals.” (Column 1, lines 26-27.) However, there is no teaching in the ‘607 Patent that metal matrix composites can be substituted indiscriminately wherever aluminum, magnesium or titanium are used or that the particular metal matrix composite therein described somehow would provide an improved horseshoe. (Weaver Decl. ¶ 9.)

The Official Action concedes that the ‘607 Patent has no discussion of specific industries in which the metal matrix composite is used and further concedes that the ‘607 Patent does not refer in any way to the “horseshoe industry”. To overcome this difficulty, the Official Action argues: “It is very well known that the horseshoe industry uses metal to make its horseshoe.” The Applicant does not contend

otherwise. On the contrary, the Applicant cited U.S. Patent Nos. 4,091,871; 4,215,750; 4,608,227; 4,655,293; and 5,564,492, which describe various horseshoes. What is not "very well known" is what Claim 1 as presently amended now requires - that the improved metal matrix composite horseshoe provides both improved vibration damping and stiffness. (Weaver Decl. ¶ 9.) There is no suggestion in the '607 Patent that a horseshoe that is made of the metal matrix composite would have both stiffness and vibration damping. (Weaver Decl. ¶ 14.) Attempting to combine the '607 Patent with Eiko L does not lead to a different result.

Eiko L is essentially the same as U.S. Patent No. 5,344,608 and European Patent EP 0 635 579 B1 which the Applicant also cited in the Prior Art Disclosure Statement (hereinafter sometimes referred to collectively as "Eiko L"). Eiko L teaches the use of an aluminum alloy horseshoe that includes specified amounts of aluminum, silicon, iron, copper, manganese, magnesium, chromium and zinc.

(Weaver Decl. ¶ 10.) However, Eiko L fails to suggest the use of any metal matrix composite horseshoe or any horseshoe having properties of both stiffness and vibration damping. (Weaver Decl. ¶¶ 8, 12 and 19.) Furthermore, high vibration damping is not a property that is common or expected in alloys such as described in Eiko L. (Weaver ¶¶ 8, 10 and 12.)

The Official Action contends that the '607 Patent can be properly combined with Eiko L to support the theory that the claimed invention is unpatentable. Essentially, the Official Action argues that it is known from the '607 Patent that metal matrix composites are substituted for aluminum metal and that it is known from Eiko L that horseshoes are comprised of an aluminum alloy. Ignoring all

differences between metals and metal alloys, the Official Action asserts that Eiko L, somehow, would lead one skilled in the art to substitute the metal matrix composite of the '607 Patent for the aluminum alloy of Eiko L.

More specifically, the Official Action states that it would be obvious to select a known material (the metal matrix composite of the '607 Patent) on the basis of its suitability for use in horseshoes as a matter of obvious design choice (as taught by Eiko L). Citing *In re Leshin*, 125 U.S.P.Q. 416 (CCPA 1960), the Official Action contends that it would be obvious to one normally skilled in the art “to use the light weight metal (sic) of [the '607 Patent] in making horseshoe (sic), since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.” (emphasis original) Such reliance on *In re Leshin* is misplaced.

In *In re Leshin*, the Applicant sought to patent a cosmetic dispenser. Two dependent claims limited the device to “plastic”, but had no greater specificity. The Applicant argued that the two dependant claims were patentable on the basis that he had to select the plastics that were actually used from a group of plastics. However, the cited references showed a “plastic” container and the Applicant conceded that the “plastics” that were actually selected were well known. With no differentiation of the claimed “plastic,” it was held that the applicant’s merely selecting a plastic from among those plastics that were admittedly known for use in containers was not patentable.

Such a rejection theory is not supported by the record in this case and does not make Claim 1 retrospectively unpatentable. In contrast to the circumstances in

In re Leshin, Claim 1 as presently amended is directed to a particular metal matrix composite and neither the '607 Patent nor Eiko L, either alone or in combination, show that the particular metal matrix composite of Claim 1 has ever been used in horseshoes having both improved vibration damping and stiffness properties. (Weaver Decl. ¶¶ 8, 9, 10, 15, 16 and 17.) What may have been within the knowledge of one skilled in the art is insufficient absent evidence that one of ordinary skill in the art actually possessed such knowledge. Smiths Indus. Med. Sys., Inc., 183 F.3d 1347, 1356 (Fed. Cir. 1999). Neither the '607 Patent nor Eiko L, either alone or in combination, evidence any known suitability of the specified metal matrix composite as having properties of both stiffness and vibration damping. (Weaver Decl. ¶¶ 12, 14, and 15.) Consequently, nothing in those references describes or suggests that one attempting to construct a horseshoe having both stiffness and vibration damping had merely to select the metal matrix composite from among a group of materials known to have such properties. (Weaver Decl. ¶¶ 12, 16, 18, 19 and 20.) Neither the '607 Patent nor Eiko L suggest that the metal matrix composite of Claim 1 has properties of both stiffness and vibration damping. (Weaver Decl. ¶¶ 8, 14, 15, 16 and 17.) Therefore, the '607 Patent and Eiko L afford no basis for even considering the metal matrix composite in making such a selection. (Weaver Decl. ¶¶ 19 and 20.)

The Official Action engages an impermissible "obvious to try" standard for which the cited references, either alone or in combination, fail to teach all the limitations required by Claim 1. The theory on which the Official Action attempts to combine the '607 Patent and Eiko L suffers from a two-fold difficulty. First, Eiko

L is directed to the use of aluminum alloys and specifically teaches away from the use of aluminum in horseshoes. (see e.g. Column 1, lines 33-48 of U.S. Patent 5,344,608.) (Weaver Decl. ¶¶ 8 and 10.) Second, the '607 Patent does not teach that metal matrix composites are substitutes for aluminum alloys. (Weaver Decl. ¶¶ 9 and 13.) The '607 Patent states that metal matrix composites have been substituted to overcome the drawbacks of metals, (Column 1, lines 26-27.) but there is no teaching in the '607 Patent that metal matrix composites similarly can be substituted for metal alloys. (Weaver Decl. ¶ 11.) Indeed, there would be no obvious motivation to substitute the metal matrix composite of the '607 Patent for the metal alloy of Eiko L when that metal alloy itself is intended to modify selected properties of the base aluminum metal.

Even assuming that Eiko L could be said to properly suggest the use of metal matrix composite in horseshoes (which it does not), nothing in Eiko L suggests that the aluminum alloy horseshoe therein described or the metal matrix composite of the '607 Patent would have both improved stiffness and improved cushioning due to vibration damping. (Weaver Decl. ¶¶ 8, 14 and 15.) On the contrary, the horseshoe that is described in Eiko L is said to achieve shock absorption because the aluminum alloy therein described is relatively ductile. In contrast, the metal matrix composite horseshoe of Claim 1 reduces shock through vibration damping while also exhibiting stiffness that tends to better retain the shape of the horseshoe. (Weaver Decl. ¶¶ 15 and 16.) There is nothing in Eiko L to suggest a horseshoe that is comprised of a metal matrix composite or any other material that affords both

stiffness and cushioning by vibration damping in accordance with the subject invention. (Weaver Decl. ¶ 8.)

Indeed, Eiko L actually teaches away from the use of a metal matrix composite to make horseshoes! Following the teachings of Eiko L, one normally skilled in the art would be led to use an aluminum alloy as opposed to the metal matrix composite as required by Claim 1. (Weaver Decl. ¶¶ 8, 9, 10 and 11.) A reference does not contain a suggestion to combine references and teaches away from the invention if one of ordinary skill in the art following the line of development disclosed in the reference would not likely produce the Applicant's result. Tec Air, Inc. v. Denso Mfg. Michigan, Inc., 192 F.3d 1353, 1360 (Fed. Cir. 1999). Ecolochem, Inc. v. Southern California Edison Co., 227 F.3d 1361 (Fed. Cir. 2000), reh'g denied, in banc suggestion declined, (December 13, 2000) and cert. denied, 121 S. Ct. 1607 (2001). (Secondary reference recommended alternative method to that of primary references.) The '607 Patent teaches the use of a metal matrix composite in place of selected metals, not metal alloys. (Weaver Decl. ¶¶ 9 and 11.) The horseshoes in Eiko L are made from an aluminum alloy, which is different than aluminum metal. (Weaver Decl. ¶ 10.) Eiko L teaches that aluminum is not preferred and that aluminum alloy is to be used. (Col. 1, lines 33-48 of U.S. Patent 5,344,608.) Using an aluminum alloy in the manufacture of horseshoes as taught by Eiko L would not lead one skilled in the relevant art to use a substitute for aluminum, namely a metal matrix composite as taught by the '607 Patent. (Weaver Decl. ¶¶ 18 and 19) Since Eiko L teaches against the use of metals, Eiko L also would teach away from the use of metal substitutes - in this case, a

metal matrix composite. Therefore, a combination of references as proposed by the Official Action would be against teachings of Eiko L and the '607 Patent.

The combination of the '607 Patent and Eiko L as proposed by the Official Action is necessarily based on the Applicant's own teachings and not the teachings of the references. Claim 1 is not made unpatentable by combining the '607 Patent and Eiko L in accordance with the Applicant's own teachings. A determination of obviousness must involve more than indiscriminately combining prior art. *Micro Chem., Inc. v. Great Plains Chem. Co., Inc.*, 103 F.3d 1538, 1546 (Fed. Cir. 1997), cert. denied, 117 S. Ct. 2516 (1997). The Patent Office must show a motivation to combine references to prevent the use of the claimed invention itself as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention. *In re Rouffet*, 149 F. 3d 1350 (Fed. Cir. 1998)(reversing the Patent Office Board of Appeals holding of obviousness). The requirement of a motivation to combine references is necessary to prevent findings of obviousness based improperly on "the subtle but powerful attraction" of hindsight reconstruction. *Ruiz v. A.B. Chance Co.*, 234 F. 3d 654, 664-65 (Fed. Cir. 2000). Absent any disclosure or suggestion of an element or step that the cited references have failed to disclose, there can be no motivation to modify the prior art to arrive at the claimed invention. *In re Kotzab*, 217 F. 3d 1365, 1370 (Fed. Cir. 2000)(reversing the Patent Office Board of Appeals and Interferences' affirmance of the Patent Office rejection of an application based on a combination of references). Accordingly, there is no motivation or suggestion to combine the '607 Patent and Eiko L because neither the '607 Patent nor Eiko L teach that a metal matrix

composite of the '607 Patent can be substituted for the aluminum alloy of Eiko L. Furthermore, even if such a substitution were to occur, neither reference teaches that the metal matrix composite horseshoe has both stiffness and cushioning due to high vibration damping.

Conceding that the '607 Patent does not teach that the metal matrix composite can be used for horseshoes, the Official Action asserts that "ordinary skill in the art" will bridge that gap. However, in this instance the missing suggestion cannot be supplied merely by reference to "ordinary skill in the art." Imbuing one of ordinary skill in the art with the knowledge of the invention at issue in the absence of art that conveys or suggests such knowledge is to fall victim to hindsight reconstruction. Al-Site Corp. v. VSI Int'l, Inc., 174 F.3d 1308 (Fed. Cir. 1999). The best tool in preventing impermissible hindsight reconstruction is the rigorous application of the requirement for a showing of a teaching or motivation to combine prior art references. In re Dembiczak, 175 F.3d 994 (Fed. Cir. 1999) (reversing the Board of Patent Appeals and Interferences affirmation of the Patent Office obviousness rejections). There is no suggestion in the '607 Patent or Eiko L as to why one skilled in the art would be led by a reference (Eiko L) that teaches the use of metal alloys in horseshoes to attempt to use a metal matrix composite that is taught in the '607 Patent to be a possible alternative for some uses of metals (not metal alloys). Furthermore, neither reference suggests that the metal matrix composite horseshoe has both stiffness and cushioning due to vibration damping. Claim 1, therefore, is patentable over those references.

Claim 9 is directed to a metal matrix composite horseshoe having “stiffness” and “vibration damping” and specifies “molten aluminum metal” for forming the metal matrix composite. Accordingly, Claim 9 is patentable over the ‘607 Patent and Eiko L for the same reasons discussed with respect to Claim 1. Claims 2-8 and 10-16 are dependent on Claims 1 and 9 respectively and incorporate the structure of Claims 1 and 9. Therefore, Claims 2-8 and 10-16 are also patentable over the prior art for the same reasons stated with respect to Claim 1.

The rejection of Claims 1-16 under the judicial doctrine of obviousness-type double patenting is based on the same combination of the '607 Patent and Eiko L as the rejection under 35 U.S.C. §103. Therefore, Claims 1-16 are patentable over the judicial doctrine of double patenting for the same reasons as previously explained herein with regard patentability of Claims 1-16 in light of 35 U.S.C. §103.

The other references that were cited in the Official Action, but not specifically applied against the claims have been carefully reviewed. However, none of those references are seen to make the presently claimed invention unpatentable.

In accordance with the foregoing amendments to the claims and in view of the above remarks, Claims 1-16 are considered to be in condition for allowance and such allowance is hereby respectfully requested.

Respectfully submitted,

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APPENDIX A

Please find below claims 1 and 9 marked-up to show the changes incorporated in the above amendment:

1. (amended) A metal matrix composite horseshoe ~~comprising a metal matrix composite~~ having improved vibration damping and stiffness, said horseshoe comprising a metal matrix composite ~~being that is~~ formed from a molten metal selected from the group consisting of aluminum, magnesium, titanium and mixtures thereof, and from particles of silicon boride composition selected from the group consisting of silicon tetraboride, silicon hexaboride and mixtures thereof, said silicon boride composition being present in a range from about 0.1 to about 80 weight percent in said molten metal.

9. (Amended) A metal matrix composite horseshoe ~~comprising a metal matrix composite~~ having improved vibration damping and stiffness, said horseshoe comprising a metal matrix composite ~~being that is~~ formed from molten aluminum metal and from particles of silicon boride composition selected from the group consisting of silicon tetraboride, silicon hexaboride and mixtures thereof, said silicon boride composition being present in a range from about 0.1 to about 80 weight percent in said molten aluminum metal.